

SAETTA: high resolution 3D mapping of the lightning activity around Corsica Island

Sylvain Coquillat, Eric Defer, Dominique Lambert, Jean-Pierre Pinty, Véronique Pont, and Serge Prieur
Laboratoire d'Aérologie, Université de Toulouse, CNRS, UPS, France

In the frame of the French atmospheric observatory CORSiCA (<http://www.obs-mip.fr/corsica>), a total lightning activity detection system called SAETTA (Suivi de l'Activité Electrique Tridimensionnelle Totale de l'Atmosphère) has been deployed in Corsica Island in order to strengthen the potential of observation of convective events causing heavy rainfall and flash floods in the West Mediterranean basin. SAETTA is a network of 12 LMA stations (Lightning Mapping Array) developed by New Mexico Tech (USA). The instrument allows observing lightning flashes in 3D and real time, at high temporal ($80 \mu\text{s}$) and spatial resolutions. It detects the radiations emitted by cloud discharges in the 60-66 MHz band, in a radius of about 350 km from the centre of the network, in passive mode and standalone (solar panel and batteries).

Initially deployed in May 2014, SAETTA operated from July 13 to October 20 in 2014 and from April 19 to December 1st in 2015. It is now in permanent operation since 16 April 2016. Many high quality observations have been performed so far that provide an accurate location in space and time of the convective events. They also bring interesting dynamical and microphysical features of those events. For example the intensity of the convective surges, the transport of charged ice particles in the stratiform area of the thunderclouds can be deduced from SAETTA observations. Specific events have also been detected as well: bolts-from-the-blue, inter cloud discharges, high level discharges in convective but also in stratiform areas, inverted dipoles. The specific lightning patterns of 2015 illustrate the complex influence of the relief, probably via slope and valley winds over Corsica and via induced lee-side convergences over the sea.

SAETTA is expected to operate for at least a decade over Corsica so it will participate to the calibration/validation of upcoming lightning detectors from space such as MTG-LI. It will also be a key instrument during the field campaign of the EXAEDRE project during fall 2018 (ANR). Corsica Island becomes now a very interesting area to host field campaigns dedicated to thunderstorm and lightning studies.

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